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dent an account of primitive child life. The author states in her preface that she was aided in the preparation of her material by the late Professor J. W. Powell, by Fred. J. V. Skiff, of the Field Columbian Museum, and by Professor Dewey, of the Chicago University; other less prominent names are mentioned as collaborators.

Perhaps the most glaring errors that the author has included in her work are certain of the pictures; these are signed by Howard V. Brown.

On page 67 is a sketch of a dinosaur, evidently intended for the *Ceratosaurus* of Marsh, an Upper Jurassic form, chasing a beast that is described as a 'five-toed horse'; accompanying this figure is the following text:

Long, long before the tree-dwellers lived there were wild horses.

They were tiny little creatures.

Perhaps you would not think that they were horses at all.

They were no larger than a fox.

They had stripes like a zebra.

They had five toes on each foot.

They lived on the marshes and on the dry land.

The land at that time was almost covered with water.

The water was filled with fish and reptiles.

Great reptiles crawled about everywhere.

They were masters of the sea and the dry land.

All the creatures feared them, the wild horses tried to keep out of their reach.

The foot of the little horse was not shaped for running, but it was fitted for climbing trees.

When a reptile appeared the *horses climbed the trees*. (Italics mine.)

They stayed in the trees till the danger was passed.

Then they came down to their pastures again.

Again, on page 62 I find a picture of a man in a tree watching a herd of the same horses (?) that were pursued by the Jurassic dinosaur! This makes man contemporaneous with the dinosaur, although it is not so stated in the text.

This book is filled with just such mistakes throughout, notably a figure of a saber-tooth tiger in fierce combat with a hairy mammoth.

That such a book is taken seriously by certain people is shown by the fact that it has

been placed in the library of at least one normal school as supplementary reading for students in the kindergarten course, girls who are preparing themselves to teach nature study to infants.

Certainly if such things as anthropology and vertebrate paleontology are to be forced on the four-year-old child the perpetrators should see that it is correct.

We are promised four other volumes by the same author from the same press! Certainly it is time to call a halt. E. C. CASE.

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#### SPECIAL ARTICLES.

##### AN ACCOUNT OF SOME EXPERIMENTS IN REARING WILD FINCHES BY FOSTER-PARENT BIRDS.

DURING the spring of 1901, having some twenty pairs of canary birds mated, I attempted to induce them, in two cases, to incubate the eggs and rear the young of wild fringilline birds. These experiments led me to continue similar efforts during each succeeding spring, and I propose to summarize the results of what occurred in this way, in 1901, 1902 and 1903.

In May, 1901, I secured a set of song sparrow's eggs (*Melospiza cinerea melodia*). There were four eggs in the nest and incubation had just started. I brought the eggs, together with the nest, to my laboratory, and took away from a very tame hen canary bird four eggs which were in her nest, substituting the song sparrow's eggs. I watched the hen canary for a short time to assure myself that my actions had not prejudiced the end I had in view, and was presently delighted to see her return to the nest and settle herself to brood the eggs as if they were her own. In due time, after about eight days, all of the eggs were hatched, and four lusty young song sparrows became the foster-children of the canary. This bird was an especially good parent, as I had proved, by her rearing with success three broods of canary birds during the preceding season of 1901, the whole of the young aggregating thirteen birds, all of which reached maturity, and were strong vigorous examples of their kind. This hen canary

seemed as solicitous for the young song sparrows as she had been for the young of her own kind, and so far as I could see, she did everything in her power to rear her foster-children. In spite of all her efforts, when the song sparrows attained an age of about six days, and were just beginning to show feathers, one by one they weakened and died, though both the parent canaries, cock and hen, fed and brooded them constantly.

Later in the same season I secured a clutch of four field sparrow's eggs (*Sipizella pusilla*), and gave them to another equally good pair of parent canaries. The results were almost identical with the case cited above; the eggs were all hatched, the young seemed strong and vigorous, the foster-parents appeared to do everything conducive to their development, but all of the young died during the first week after they were hatched from the egg. This concluded my efforts in this direction for the spring of 1901. In the month of May, 1902, I was able to carry on a much more elaborate series of experiments, which I will now summarize. Some of these, in the light of my former experience, I conducted under slightly varying conditions, which I thought might yield more definite results. On May 11, 1902, I found in a field on the ground a nest of field sparrows, the female sitting on four eggs, and there were, at the same time, two larger eggs in the nest, which I took to be those of the cowbird (*Molothrus ater*). The nest and eggs I brought to the house, keeping them warm, and placed the four field sparrow's eggs under a hen canary which was sitting, and the two cowbird's eggs I gave to another canary. Both females covered the new eggs which had been introduced into their nest, and brooded them within a moment after I had left them. The four field sparrow's eggs, placed under the first canary, began to hatch on the morning of May 22. I had left one canary bird's egg in this nest, and this also was hatched early the next day. Another of the field sparrow's eggs hatched late on May 22, and in the morning of May 23 there were in the nest one canary and three field sparrows, and one unhatched egg of a field sparrow. On May 24 I dis-

covered the three field sparrows dead in the nest, but the young canary bird was flourishing, and in the course of time grew up to maturity under its parents' care.

To return to the cowbird's eggs in the same clutch; both of these eggs were hatched on the morning of the twenty-second, and, also, two canary bird's eggs which I had left with them, so that there were two cowbirds and two young canary birds in the nest. Throughout the day and on the succeeding one the parent birds paid close attention to the brood, and the young birds, I could see, were strong and hearty, as all four of them raised their heads to be fed, and seemed to be treated precisely alike by the two parent canaries. The same conditions prevailed on May 24. On the morning of May 25 the birds were doing well and had grown rapidly. On the afternoon of May 25 one of the cowbirds died, though the other was still strong, and with the two young canary birds was constantly fed by the parents. On May 25 the second cowbird died, and I introduced two young chipping sparrows, apparently of about the same age as the two young canaries, to take the place of the two cowbirds. I saw the old canary bird at once feed the two sparrows as she did her own birds, and during the day a young man, whom I had posted to watch the proceedings, reported that they were constantly fed. On May 27 the two young sparrows were strong and healthy, as well as the young canaries. The same conditions prevailed on the twenty-eighth, and on the twenty-ninth of the month. On May 30 one of the sparrows died and was removed, the other appeared strong and healthy, and so far fledged that its species could be discriminated. The old birds fed the remaining young one throughout the day as well as the young canaries. On May 31 the young sparrow and the canaries were vigorous and flourishing. This condition of affairs was maintained until June 2. On June 2 I found the single sparrow so far grown as to be able to leave the nest, though the two canaries were not so far advanced. At eleven o'clock the young sparrow left the nest and hopped about the floor of the cage; after an hour I put him back in the nest, where he remained till the

next morning. On June 3 the chipping sparrow again left the nest, and I did not return him to the structure until late in the day. On the fourth, the two young canaries and the chipping sparrow all left the nest, though the canaries resorted to it from time to time. All the birds grew and flourished, but on the ninth of June the chipping sparrow died. The two canary birds, however, thrived and ultimately reached maturity. During the latter part of his life the sparrow was going about the bottom of the cage and hopping on the perches, attended to carefully by the parent birds. He, however, did not seem especially strong in his legs, and for a short period, four or five hours before his death, he was not only unable to grasp the perches, but could not run about the bottom of the cage as he had done earlier. I concluded that several factors may have militated against the rearing of this bird by the canaries: (1) His development seemed more rapid than that of the young canaries, and he was more restless and anxious to leave the nest than were the domesticated birds. (2) I think that the artificial lining of the canary's nest was of such a nature as not to permit the proper development of the leg muscles and feet during the time he was in the nest. (3) The length of the tarsus in the sparrow, being twice as great as that of the canary birds, seems an important element to take into account, as this part of the leg was so long that it seemed to be not only in his way, but was constantly trodden on and sat upon by his two associates. It must be remembered that this bird left the nest voluntarily on the date first mentioned, and though restored several times, very soon left it again. He appeared to be very uncomfortable in the nest, and this discomfort was largely due to the length of his legs. At the time of his death the bird was about two thirds grown, and almost fully feathered in the first plumage of the chipping sparrow (*Spizella socialis*); though he could hop about the floor of the cage, and for a time was able even to balance himself on the perches, his legs, on the whole, seemed weak, and I attribute the cause of this misdevelopment of the muscles and tendons of the feet and legs

to the kind of nest lining used by the canaries. I may say here that this consisted of deer-hair with an admixture of cow-hair, the whole being a felted mass, and not presenting the grasping surface afforded by the fabric and lining of the chipping sparrow's nest, as found out of doors.

My experiments in the season of 1902 included, besides the above, an additional brood of song sparrows, which contained four song sparrow's and one cowbird's egg. All of these hatched and lived from periods varying from four to seven days, none of the birds leaving the nest. I also experimented with a clutch of five fresh eggs of the yellow-winged sparrow (*Ammodramus savannarum passerinus*), which I divided between two different parent canaries, leaving two canary's eggs with three yellow-winged sparrow's eggs, and in the other case two yellow-winged sparrow's eggs with three canary bird's eggs. Both clutches were hatched, there being five young birds in each nest. The canary birds in both cases were reared and reached maturity, but the young yellow-winged sparrows which were also hatched died at ages varying from four to seven days.

I also attempted during this season to raise young bobolinks under canaries (*Dolichonyx oryzivorus*); to this end on May 28, having found a nest of five eggs, I introduced two of them to a large breed of English canary, leaving two of her own eggs in the nest; the other three bobolink's eggs I placed under another canary of a similar kind, leaving two canary eggs in addition. This canary threw out her own eggs, but retained the bobolink's eggs, and incubated them till they were hatched, which was on June 8. The three young bobolinks lived for three days, when one of them died; the remaining ones died on the fifth day. The other bobolink's eggs, under the English canary, were also hatched on the eighth, but both died on the tenth of the month; the young canary birds hatched at the same time were reared to maturity, when I no longer followed their history.

In the spring of 1903 I tried several similar experiments, sometimes putting but one egg of a wild bird with a clutch of canary's eggs,

and never giving one canary an entire complement of wild bird's eggs. In all cases the eggs were hatched and in no case did the foster-young attain an age of more than a week, though it is to be remembered that in every case young canaries in the same brood with the foster-birds flourished and reached maturity. During the season of 1903 I took two young song sparrows, just beginning to show the feathers, and put them with two canaries about the same size, though more fully feathered. These birds were readily adopted by the parent canaries, but one of them died after three days; the other was reared, reached maturity, was weaned by the old birds, being treated precisely as were their own young, and is still alive at this writing.

This series of experiments I have reported as a suggestion for further work of a similar kind. I had hoped that hatching the eggs of wild birds under canaries would enable me to observe the development of the foster-young to an advanced age. It seemed to me that there would be no possibility of their song being other than such as could be attributed either to inheritance or to intimate association with a new kind of singing bird. In all this I have, of course, met with disappointment; the only young bird being reared to maturity, from the many I have tried, was a song sparrow, almost fledged before introduced to his foster-parents. It has occurred to me that perhaps the kind of food, partially digested by the parent canary birds, and then regurgitated and fed to their young, would have militated against the growth and development of another kind of bird. However, in the case of three cowbird's eggs upon which I have experimented, all of which were hatched, this should not have prejudiced their growth, when we consider the variety of foster-parents that are induced to hatch and rear the eggs and young of the cowbird.

To briefly summarize the work I have described in some detail, forty-one different eggs of wild birds, representing six species, and three young birds already hatched, form the aggregate of individuals dealt with. All of the forty-one eggs were fertile, and were hatched by the foster-parents. This is sug-

gestive in regard to the propagating powers of wild birds, and though not conclusive, indicates a much higher percentage of fertility in the eggs laid by them than obtains in song birds when caged, or semi-domesticated. None of the young which were hatched from these eggs reached a greater age than seven days, which would seem to indicate that the food supplied by the foster-parents, which was the same on which they raised their own offspring, was of a kind so different from that used by wild birds in rearing their young, that it proved inadequate. I also believe that the nest lining was of a character so unlike that of the nests natural to the foster-chicks, that it prejudiced their development and growth.

In the light of the knowledge I have gained I shall endeavor, in the coming breeding season, to conduct further experiments of a similar character, and hope for better results. It seems worthy of note that I have been able to rear not only all the kinds of birds mentioned by hand, but in addition some twenty other species of song birds. These birds have been taken from their parents' care at ages varying from three to six or seven days, and over ninety per cent. have been successfully reared, being fed by hand. Such birds in most cases have not only reached maturity, but many of them have lived from three to seven years.

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#### NOTES ON POLYODON, I.

WHILE engaged last summer on the upper Mississippi in investigating the natural history of the spoonbill (*Polyodon spathula*) I had occasion to examine a great many specimens, caught by the fishermen in a five-hundred-yard seine. My attention was soon called to the presence of a pair of minute barbels some distance in front of the mouth. Not recalling any reference to these in the literature on *Polyodon*, I examined a great many specimens and invariably found them present. A further examination of the literature shows that among systematists these barbels have been entirely overlooked, although the ordinarily recognized affinities of the fish to the